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10/576,282	04/19/2006	Rainer Papp	13111-00038-US1	1949
30678 7590 09/22/2010 CONNOLLY BOVE LODGE & HUTZ LLP 1875 EYE STREET, N.W. SUITE 1100 WASHINGTON, DC 20006				
EXAMINER				
NOLAN, JASON MICHAEL				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/576,282

Applicant(s)

PAPP ET AL.

Examiner

JASON M. NOLAN

Art Unit

1626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5 and 12-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5 and 12-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is responsive to Applicant's Request for Reconsideration-After Non-Final Rejection, filed July 26, 2010. Claims 2-8, 10-14, & 16-22 are pending. Claims 1, 9, & 15 are cancelled.

Response to Arguments

Claims 2-8, 10-14, & 16-22 stand rejected under 35 U.S.C. § 103. Applicants assert that the instant disclosure provides evidence of unexpected results. The Examiner acknowledges that this may be true, but unexpected results are not dispositive in regard to a conclusion of non-obviousness. In other words, the evidence of unexpected results is but one factor in the analysis set forth by the Court in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). Next, Applicants assert that the instant application serves two purposes: stabilization of a catalyst and the retention of catalytic activity. To this end, Applicants argue that Jackstell does not disclose that as a purpose. Instead, the main concern of Jackstell is the regioselectivity of the ligands. In response, the Examiner points out that this argument was rejected by the Court:

In determining whether the subject matter of a patent claim is obvious, *neither the particular motivation nor the avowed purpose of the patentee controls* (emphasis added). What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under §103. One of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.

The first error of the Court of Appeals in this case was to foreclose this reasoning by holding that courts and patent examiners should look only to the problem the patentee was trying to solve (citation omitted). The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter. *The*

question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed (emphasis added).

KSR International Co. v. Teleflex Inc., 82 USPQ2d, 1385, 1398 (2007). The Court set forth the following guidance with respect to the objective reach of a claim whether the claim extends to what is obvious under §103:

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. . . . If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

Id. at 1390.

The instant application is drawn to a hydroformylation process. The obviousness analysis provided by the Examiner proceeded through a combination of references, which disclosed the known options that would have been at the disposal of a hypothetical chemist having ordinary skill in the art at the time of invention. Per the direction provided by the Court, the Examiner is permitted to combine references in a manner that is independent from the motivations or purposes of the instant inventors.

Accordingly, the Examiner did not combine references arbitrarily, but instead evaluated the prior art through the lense of a hypothetical chemist having ordinary skill in the art at the time of invention with the following caveat in mind: although a combination of relevant options in a particular art may have been obvious to try, there are instances where an invention would not have been obvious to try:

1) When the inventor would have had to try all possibilities in a field unreduced by direction of the prior art. In other words, when "what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful" an invention would not have been obvious. *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988). This is another way to express the *KSR* prong requiring the field of search to be among a "finite number of identified" solutions. 82 USPQ2d at 1390.

2) An invention is not obvious to try where vague prior art does not guide an inventor toward a particular solution. A finding of obviousness would not obtain where "what was 'obvious to try' was to explore a technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it." *O'Farrell*, 853 F.2d at 903. This expresses the same idea as the *KSR* requirement that the identified solutions be "predictable." 82 USPQ2d at 1390.

In this case, the Examiner finds that the state of the art (i.e., the hydroformylation art) is very advanced. For instance, Jackstell discloses that the catalytic hydroformylation of olefins (the "oxo process") is an old (discovered in 1938; p. 3871) and well known synthetic transformation, which is widely used in industry (more than 6.6 million tons of product produced with this process (p. 3871). Next, the Examiner finds that the problems that may arise in this art were known at the time of invention. For

example, the US 7,173,138 patent (Ahlers; col. 37) discusses catalysts in terms their activity and stability. This fact demonstrates that Applicants were motivated to solve known problems in the art of catalytic hydroformylation. As illustrated by the '138 patent, a skilled artisan attempting to solve the same or similar problems in a hydroformylation reaction would have been motivated to understand the problems and solutions identified and addressed by those that came before (i.e., the prior art). The Examiner finds that one of ordinary skill in the art would have visited the proposed solutions identified in the art. This includes the use of a base to stabilize a hydroformylation catalyst. In this case, the prior art is not vague, but guides the artisan to a reduced number of possibilities for improving stability and activity of a catalyst. As provided in the rejection below, the prior art expressly identified the use of triethylamine for a means to that end.

Accordingly, Applicant's "unexpected results" are not dispositive in the obviousness analysis provided on the record, but have to be considered in view of the other *Graham v. Deere* factors. Applicant's characterization of the Leuring, Dennis, and Leung references and Applicant's subsequent conclusion that the combination of those references does not provide for the conclusion of obviousness is not convincing. Applicants point to differences between the prior art and the instant application and then infer a conclusion that it would *not* have been obvious for one of ordinary skill in the art to read and combine the references. The Examiner reminds Applicant that the prior art must be considered as a whole:

In *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537, 218 USPQ 871, 877 (Fed. Cir. 1983), the Court noted that "the question under 35 U.S.C. § 103 is not whether the differences [between the claimed invention and the

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prior art] would have been obvious" but "whether the claimed invention *as a whole* would have been obvious (emphasis in original)."

MPEP § 2144.08. Also, the difference between the prior art and the instant application must be considered in view of the knowledge that the skilled artisan possesses:

Prior art is not limited just to the references being applied, but includes the understanding of one of ordinary skill in the art. The prior art reference (or references when combined) need not teach or suggest all the claim limitations, however, Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. The "mere existence of differences between the prior art and an invention does not establish the invention's nonobviousness." *Dann v. Johnston*, 425 U.S. 219, 230, 189 USPQ 257, 261 (1976).

MPEP § 2141. For all of the above reasons, and the reasons provided in the analysis below, Applicant's arguments are not convincing and the 103-prior art rejection is maintained herein.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

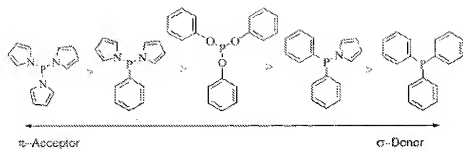
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

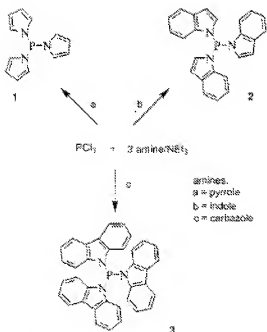
Claims 2-8, 10-14, & 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackstell *et al.* (*Eur. J. Org. Chem.* 2001, 3871-3877; "Jackstell") in view of Ahlers *et al.* (WO02/083695 & US 7,173,138; "the '138 patent"), US 5,731,472 ("the '472 patent"); US 4,567,306 ("the '306 patent", IDS); US 4,260,828; US 4,283,562; van Leeuwen in Chapter 9 of Catalysis by Metal Complexes, Vol. 22, Rhodium Catalyzed Hydroformylation, 2002, Kluwer Acad. Pub., pp. 233-251; Moloy *et al.* *J. Am. Chem. Soc.* 1995, 117, 7696-7710; Trzeciak *et al.* *J. Chem. Soc. Dalton Trans.*, 1997, 1831-1837 (IDS); and Xu *et al.* *Tetrahedron Lett.* 1997, 38(42), 7337-7340.

1. *Determining the scope and contents of the prior art* – Jackstell discloses that the catalytic hydroformylation of olefins (or "oxo process") is an old (discovered in 1938; p. 3871) and well known synthetic transformation, which is widely used in industry (more than 6.6 million tons of product produced with this process (p. 3871). Jackstell discloses that there are limitations in a continuous hydroformylation process because of limited stability of some catalytic ligands, such as phosphite ligands. *Id.* Jackstell then states that "phosphanes would offer advantages over phosphites in terms of stability." *Id.* Jackstell then discusses the properties of phosphorus ligands on p. 3872, shown below.

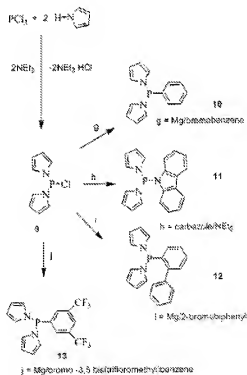


Scheme 2. π -Acceptor and σ -donor properties of different P ligands

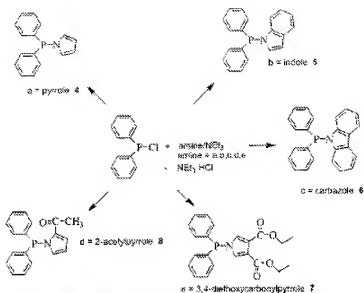
Jackstell then discloses the synthesis of various phosphorus ligands, shown below, and hydroformylation experiments utilizing said ligands. See, pp. 3872-3877.



Scheme 3. Synthesis of ligands 1-3



Scheme 5. Synthesis of ligands 10-13



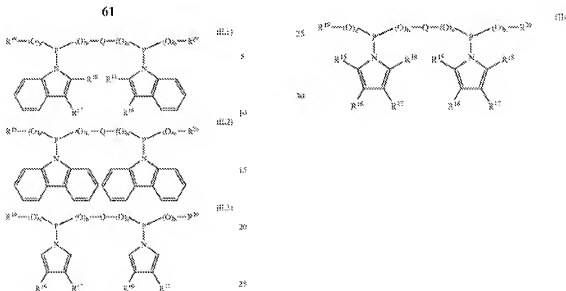
Scheme 4. Synthesis of ligands 4-8

Several of the phosphorus ligands disclosed by Jackstell fall within the scope of formula I, wherein R^1 = a pyrrole group bound by the nitrogen atom to the phosphorus atom; $\text{a} = \text{b} = 0$; and R^2 = aryl or heteroaryl.

It is noted that Jackstell was not the first to synthesize 1-pyrrolylphosphorus ligands (they have been studied since at least 1995; See Moloy *et al.*). It is also noted that Jackstell was not the first to use 1-pyrrolylphosphorus ligands in the catalytic hydroformylation process (they have been used since at least 1997; See Trzeciak *et al.*).

The '138 patent discloses a hydroformylation process in the presence of a catalyst that utilizes 1-pyrrolylphosphorus ligands (See Claims 9, 10, & 17, shown below) having a bridging group Q ($\text{Q} = \text{Y}$ in the instant application; See structure in Claims 1 & 9 in the '138 patent). Claims 13-21 and Examples 1-37 (specification, col.

47-55) outline the synthesis, use, and stability of the phosphoramidite ligands. The '138 patent discloses work-up procedures, including fractionalization, in col. 32-41.



Jackstell discloses that the stability of the catalyst in the hydroformylation process is a pressing concern. The '472 patent states, "stabilization of the catalyst and organophosphite ligand remains a primary concern of the art. Obviously catalyst stability is a key issue in the employment of any catalyst. Loss of catalytic activity due to undesirable reactions of the highly expensive rhodium catalysts can be detrimental to the production of the desired aldehyde. . . ." See col. 1-2. See also, van Leeuwen at 233 ("catalyst stability has been a key issue, next to selectivity and activity.").

The use of a base is one means to stabilizing a hydroformylation catalyst-complex. The '472 patent discloses the use of "free heterocyclic nitrogen compounds . . . to prevent and/or lessen deactivation of metal-organopolyphosphite ligand complex

catalysts that may occur over the course of time during processes, e.g., a hydroformylation process . . .” See, col. 2, ll. 50-54. The ‘306 patent discloses the use of tertiary amines (particularly triethylamine; col. 4, ll. 65-68) in hydroformylation media to increase stability. See, col. 3-6. The ‘306 patent demonstrates that better results are observed with the use of a tertiary amine in a comparison study of hydroformylation reactions with and without triethylamine (See Tables 1 & II).

At the time of invention, the use of solid-supported bases (or polymer-supported base) in organic synthesis were known in the art. Xu *et al.* discloses general method for the use of a polymer supported guanidine base.

2. *Ascertaining the differences between the prior art and the claims at issue* – Jackstell and the ‘138 patent do not disclose the use of a base in their hydroformylation experiments.

3. *Resolving the level of ordinary skill in the pertinent art* – the level of ordinary skill in the art may be found by inquiring into: (1) the type of problems encountered in the art; (2) prior art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of the technology; and (5) the education level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc.*, 807 F.2d 855, 962 (Fed. Cir. 1986). All of those factors may not be present in every case, and one or more of them may predominate. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983).

Based on the typical education level of active workers in the field of organic chemistry, as well as the high degree of sophistication required to solve problems

encountered in the art, the Examiner finds that a person of ordinary skill in the art would have at least a college degree in the field of organic chemistry and at least four years of work experience, i.e. a masters or doctorate level scientist.

4. *Considering objective evidence present in the application indicating obviousness or nonobviousness* – as pointed out on p. 5 (ll. 9-19) of the instant specification, the addition of a base provides additional stability to the hydroformylation catalyst and such stability is surprising because the ligands already contain basic nitrogen atoms. Applicants have provided studies of hydroformylation reactions comparing the results with and without the use of a base.

However, Applicant's finding that the use of a base improves the stability of the catalyst-ligand system and the overall result is not an unexpected finding. As pointed out above, the prior art has long recognized stability of the catalyst-complex as one of the primary concerns in continuous hydroformylation reactions. *See, i.e.*, US 4,260,828 and 4,283,562. The use of a base, in particular, to enhance stabilization has been recognized in the art. *See, i.e.*, US 4,567,306 and 5,731,472.

Conclusion – the Federal Circuit stated "[o]bviousness does not require absolute predictability of success . . . all that is required is a reasonable expectation of success." *O'Farrell* at 903-904. *In the instant case*, the prior art cited above supports the conclusion that a person of ordinary skill in the art, at the time of invention, would have been motivated to try known options within their technical grasp in the hydroformylation process art.

Jackstell and the '138 patent are the starting point, which disclose hydroformylation processes which utilize a catalyst-complex containing 1-pyrrolylphosphorus ligands. This starting point is not vague, but in fact the references disclose specific catalytic complexes that are likely to be successful in hydroformylation chemistry. Those references and the secondary references disclose that one of the major concerns in hydroformylation chemistry is the stabilization of the catalyst-complex. The secondary references disclose that utilizing a base to improve stabilization was known in the art at the time of invention. Further, the use of solid-supported bases in organic synthesis was known in the art at the time of invention.

Thus, the prior art as a whole discloses a finite number of predictable solutions for a skilled artisan attempting to solve the identified problem. Because the specification fails to produce evidence of unexpected results, a long-felt industrial need, or other secondary considerations, the Examiner concludes that one of ordinary skill in the art would have been motivated to arrive at the instant claimed invention with an expectation of success.

Conclusion

No claims are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Telephone Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Nolan whose telephone number is (571) 272-4356 and e-mail is Jason.Nolan@uspto.gov. The examiner can normally be reached Monday - Friday (9:00AM - 5:30PM).

/Jason M. Nolan/

Examiner, Art Unit 1626

/Rebecca L Anderson/

Primary Examiner, Art Unit 1626